

LA-UR-21-23392

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Title: Operational and Mission Highlights A Monthly Summary of Top Achievements March 2021

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Intended for: Monthly Newsletter

Issued: 2021-04-08

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# Operational and Mission Highlights

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A MONTHLY SUMMARY OF TOP ACHIEVEMENTS

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**March 2021**

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## Livermore and Los Alamos Prepare for First Experiment Under New DARHT Weather Enclosure

In February 2021, experimenters from Lawrence Livermore National Laboratory visited LANL to prepare for the first experiment ever conducted under the new weather enclosure located at the LANL's Dual Axis Radiographic Hydrodynamic Test Facility (DARHT). The new structure encloses the firing point of DARHT's hydrodynamic experiments, thus promoting a predictable and consistent fielding environment for experiment packages while shielding the facility's high-tech camera system and its other complex diagnostics equipment from rain, snow, wind and other weather-related conditions.

## New Tool Improves LANL's 3D Weapon Safety Analysis

Thanks to the fast, accurate codes of the Laboratory's Safety Applications Project (SAP) and to the access to the Laboratory's High Performance Computing (HPC) machines, it is now possible within one or two weeks to address the daunting task of quickly responding to weapons safety questions.

Despite these benefits, another challenge remains, namely that developing new 3D experiments require many iterations. The problem arises from terabytes of results from such simulations, which then must be processed to prepare for the actual experiment or answer questions from production facilities.

To address this challenge, computer scientists will apply a new tool known as RIFT. RIFT helps safety modelers quickly compare simulation results with experimental results. This comparison enables modelers to spend less time manipulating large datasets and more time focusing on the important physics in the simulations.

The tool automatically detects and extracts surface features from the results of a 3D simulation and uses ray-tracing capabilities to improve comparisons to radiographic images. A graphical user interface (GUI) is included, so that a user can customize the overlay of the simulation results with the experimental data. RIFT is parallelized so that it can process large datasets in a short time periods, such as seconds to minutes instead of the hours to days the process typically takes when performed by hand.

## Pu@pRad Project Completes Baseline Design Review for Outer Pressure Containment Vessel

The Pu@pRad project has been designed to re-establish the ability for personnel to perform plutonium experiments in the pRad facility located at the Los Alamos Neutron Science Center (LANSCE). This project recently completed the Baseline Design Review for the Outer Pressure Containment Vessel. Further experimental testing of the Inner Pressure Confinement Vessel began at the Laboratory's Eerie firing site on February 17, 2021.

## Re-Machining of Remaining Nightshade B Samples Now Underway

Nightshade B samples will undergo heat treatment, surface profilometry and metrology before personnel make final sample selection and start assembly operations for Nightshade B. A revised Nightshade B schedule has been released, this schedule addressing input from TA-55 (the Laboratory's Plutonium Facility) and the Nevada National Security Site.

Final Nightshade B assembly that mates the plutonium samples with high explosive subassemblies has been planned to take place in early May 2021 at the Device Assembly Facility, followed by insertion of the assemblies into U1a and execution in mid-June 2021.

## Series of Dynamic Phase Contrast Imaging Experiments Completed at Dynamic Compression Sector

This series of experiments focused on three areas: (1) shockwave measurements in stochastic foams for error reductions in Hugoniot measurements, (2) localization phenomena in additively manufactured structures, and (3) damage evolution in spall of magnesium. The results support the advancement of low Z material options for the future stockpile.

## Weapons Production Stand-Down Provides Organization Learning for All Employees

On March 10 and 11, 2021, the Associate Laboratory Directorate for Weapons Production (ALDWP) partic-

ipated in a two-day “Stand-down for Organizational Learning” from operations. Employees spent these two days in a professional-development setting, where they learned about recent safety-related events and participated in roundtable discussions with management on what went well and what did not go as expected in each event.

The days’ agendas included presentations on COVID-19 status and expectations (with content provided by Laboratory Director Thom Mason), sharing on nuclear and non-nuclear operational upsets and lessons learned, and roundtables led by group leaders in which employees participated in open and honest discussions about ideas for improvements in their workplaces. Of the directorate’s more than 1,300 employees, management saw almost complete participation, even exceeding the 11,000-participant Webex limits and thus requiring backup sessions. The stand-down days allowed all AL-DWP employees to pause and take some time to learn and share concerns and solutions.

## **Z Simulation Team Boosts Plutonium Z Experiments by Pushing Bounds of Code Capabilities and Analysis**

The Z Simulation team released a pre-shot report for plutonium-aging Z experiments scheduled for March 2021. The report bounds the expected response to be observed by velocimetry and temperature diagnostics. In addition to guiding the analysis for the present experiment set, the tools developed here are providing direction for future experimental campaigns.

### **SCIENCE, TECHNOLOGY, AND ENGINEERING**

## **2020 Annual Report Covers Activities in Nuclear Nonproliferation and Security Programs**

The Laboratory’s Global Security Nuclear Nonproliferation and Security Program Office released its [annual report](#) this week. The report highlights work in nonproliferation R&D, global material security, nonproliferation and international engagement, material management and minimization, and space systems and science that took place in 2020.

## **Artificial Intelligence Tool Finds Key Information in Huge Data Streams**

An artificial intelligence (AI) platform, SmartTensors use sophisticated and unsupervised machine learning to find key data features that explain a whole dataset. Such a capability promises to be a boon for big-data analytics. Boian Alexandrov of Physics and Chemistry of Materials (T-1) led this study, which notes that the AI software extracts — without any preconceived hypotheses — latent variables, or features, from a dataset that describes the whole data and mechanisms buried in it.

SmartTensors make big data manageable, reducing a huge dataset to a scale that computers can process and subject-matter-experts can analyze. The extracted features are explainable and understandable.

SmartTensors uniquely estimate the latent dimension of large (1 terabyte or more), dense, sparse, and diverse datasets. The software analyzes dataset structure and identifies hidden physical processes. Running on distributed central processing units (CPUs), Graphic Processing Units (GPUs) and tensor processing units (TPUs), the software was developed using Python, Julia and C++. It uses open-source and custom libraries, working on different platforms from supercomputers like Summit (Oak Ridge National Laboratory) and Sierra (Lawrence Livermore National Laboratory) to typical desktops and Quantum Annealers (D-wave, LANL).

## **First Results from Mars: SuperCam is in Good Health and Delivers Sounds and Images**

Following the successful landing of NASA’s Perseverance rover in Jezero Crater on Mars, the SuperCam operational team at the Laboratory received the first results showing that SuperCam is in good health and giving its first impressions of the crater.

Located at the top of the Perseverance rover’s mast, SuperCam is currently undergoing a series of tests designed to verify its systems’ operating status. The tests are part of an overall rover checkout phase that will last nearly three months. The data collected by the engineers and scientists at the controls of SuperCam provide a very positive assessment of its health and capabilities.

Hailed by NASA as a “Swiss Army knife” of instruments, SuperCam brings together five remote techniques

intended to study the geology of Mars and help select samples that will be collected by the Perseverance mission. This includes four imaging techniques: Laser Induced Breakdown Spectroscopy (LIBS), Raman spectroscopy, visible and near infrared reflectance spectrometry and high-resolution color photography. In addition, SuperCam features a microphone that listens to the atmosphere on Mars and records the zapping sounds from the LIBS laser.

Read more about SuperCam [here](#).

## HAWC Gamma Ray Observatory Discovers Origin of Highest-Energy Cosmic Rays in the Galaxy

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A longtime question in astrophysics appears finally to have an answer, thanks to a collection of large, high-tech water tanks on a mountainside in Mexico. Data collected from the High-Altitude Water Cherenkov (HAWC) shows that the highest-energy cosmic rays come not from supernovae but from star clusters. The origin of the highest-energy cosmic rays in the galaxy has been an open question in astrophysics for more than 60 years. Very few regions of the galaxy have both the power to produce high-energy particles and the necessary environments to boost those particles to the petaelectronVolt (PeV) energies seen in the highest-energy cosmic rays.

Laboratory postdoctoral researcher Kelly Malone developed the algorithms used to analyze the highest-energy HAWC photons, which were chronicled in a paper published in *Nature Astronomy*. Moreover, the paper that first identified the Cocoon as a significant emitter of high-energy gamma rays using the HAWC high-energy catalog was led by Malone, currently the leader of the Galactic Science Working Group within HAWC.

## Laboratory Launches New Machine-Learning InfoHub

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The Laboratory launched a new [website](#) that provides information on machine-learning (ML) activities throughout the institution. This new infohub also documents resources scientists can use to coordinate and collaborate on such research. All Laboratory scientists interested in ML topics are encouraged to add themselves to the site's staff directory and list their seminars on the website. The site also includes the following:

- A special weekly ISTI (Information Science and Technology Institute) seminar slot for ML presentations. The seminar series has just begun and those interested are encouraged to invite speakers to give a talk.
- Building on the efforts of a trustworthy ML team, users can join the ML@LANL Mattermost chat channel at <https://mattermost.energy.gov/trml/>.
- LANL-themed ML graphics and logos are available for use.

Aric Hagberg, Deputy Division Leader for the Computer, Computational and Statistical Science Division, along with Carleton Coffrin of Information Systems and Modeling (A-1), are the strategy and staff coordination leads, respectively. The site was created by the communication team based in the Associate Laboratory Directorate for Simulation and Computation.

## Mullen Receives Medal of Commendation for Service on Army Science Board

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The United States Department of the Army recognized Global Security Chief Operating Officer Evelyn Mullen for outstanding contributions to the Army Science Board. Serving on this board since August 2014, Mullen was recently honored with the Civil Service Commendation Medal by the Army. Mullen applied her expertise to numerous technical topics, including Battlefield Uses of Artificial Intelligence, Nuclear Survivability and Modeling and Simulation. She also served as Vice Chair for a study titled "Internet of Things" and used her extensive knowledge of weapons of mass destruction to contribute to the 2015 Human Interaction Study.

## Myers Delivers Keynote at Next-Gen Artificial Intelligence for Proliferation Detection: Domain Aware Methods Workshop

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On February 24, 2021, Kary Myers (Deputy Group Leader of CC-6, Statistical Sciences) delivered a keynote address titled "Domain Aware AI: There and Back Again" at the NA-22 workshop Next-Gen Artificial Intelligence (AI) for Proliferation Detection: Domain Aware Methods.

Myers also participated in the workshop's panel, "Requirements and Opportunities for Domain Aware



Methods in Proliferation Detection,” with panelists from NNSA, DOE-IN and the Defense Threat Reduction Agency. Myers was the only national laboratory representative on that panel. More than 300 participants from government, national laboratories and academia registered for the workshop.

Other presenters included (1) Dave Osthus (CCS-6) on “Inferring the Dynamic Location of an Environmentally-Constrained Radiative Source with a Network of Detectors;” (2) Natalie Klein (CCS-6) on “One-shot Target Detection via Physics-Informed Training;” and (3) Erik Skau (CCS-3, Information Sciences) on “Annotation Transfer for Prediction of Industrial Operations.”

Myers will host a reprise of all Laboratory talks from the workshop, including her keynote, on Friday, March 5, 2021. This event is open to any Laboratory employee.

## **New Fabrication Method Paves Way for Large-Scale Production of Perovskite Solar Cells**

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A new, simpler solution to fabricate stable perovskite solar cells overcomes a key bottleneck to large-scale production and commercialization of this promising renewable-energy technology, which has remained tantalizingly out of reach for more than a decade. Work performed by Laboratory personnel and collaborators at National Taiwan University paves the way in the near future for low-cost, high-throughput and commercial-scale production of large-scale solar modules.

Corresponding author Wanyi Nie, a research fellow at the Laboratory’s Center for Integrated Nanotechnologies, said the team demonstrated the approach through two mini-modules that reached “champion levels” of converting sunlight to power with greatly extended operational lifetimes. Because the process is facile and low cost, it can be easily adapted to scalable fabrication in industrial settings.

Perovskite photovoltaics, seen as a viable competitor to the familiar silicon-based photovoltaics on the market for decades, have been a highly anticipated emerging technology over the last decade. Commercialization has been stymied by the lack of a solution to the field’s primary grand challenge: scaling up production of high-efficiency perovskite solar cell modules from the bench-top to the factory floor.

## **New Laboratory-Developed Generator System Kills Cancer Tissue While Sparing Nearby Healthy Cells**

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Improved options for cancer treatment are on the way, thanks to a new system developed at Los Alamos National Laboratory that produces alpha-emitting medical radioisotopes intended to target and overpower diseased tissue while sparing the healthy tissue around it.

“The new system is based on a uranium-230/thorium-226 pairing, where the thorium-226 is supplied in a form suitable for medical applications,” said Michael Fassbender, the lead researcher for this Laboratory project who works for the Chemistry Division’s Inorganic Isotope & Actinide Chemistry group. “The thorium-226 emits multiple alpha particles as it decays, delivering a powerful blow to diseased cells. This is similar to actinium-225, another promising alpha therapy isotope. The DOE Isotope Program is committed to making multiple options or a variety of radioisotopes available to accelerate the development of therapeutics that could be used to treat different cancers.”

The Laboratory will make this generator technology available to researchers through the National Isotope Development Center (NIDC), giving them a consistent supply of thorium-226 to use in investigating the next steps in creating the radiopharmaceuticals needed to treat patients.

## **New Machine Harnesses Earth’s Magnetic Field to Detect Chemicals**

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A Laboratory-designed spectroscopy instrument enables scientists, industry and governments to decipher trace amounts of chemicals using the Earth’s own magnetic field. Called the Earth-field Resonance Detection and Evaluation device (ERDE, which is German for “Earth”), the instrument is the most sensitive, affordable and portable technology of its kind. ERDE the ability to detect a range of chemicals, including those commonly used in scientific labs, biological weapons and even slight traces of insecticides in drinking water.

ERDE works similarly to an MRI machine, except that it senses chemical compounds in a much smaller volume. A little larger than a microwave, the ERDE spectroscopy instrument works by passing a sample through a small set of magnets, which helps to build the signal in the

spinning nuclei. The chemical sample rapidly moves into a small box that harnesses the Earth's natural magnetic field — this is the same type of force that directs a compass needle to point north. The interaction of the chemical with Earth's magnetic field is then detected.

## Simulating LANL Workloads to Evaluate Needs for Prospective Tradeoffs in High Performance Computing Reliability

Laboratory researchers are evaluating High Performance Computing (HPC) system designs for fault resilience. Such evaluations consist of injecting faults from a job scheduler into a simulation by using actual Laboratory workload traces.

HPC system (e.g., CTS2 and Crossroads) procurements require analysis of tradeoffs between component sizes, performance and reliability. These tradeoffs are often expressed in terms of X faster performance at the cost of Y less reliability.

Given the varying nature of Laboratory workloads, evaluating these tradeoffs can be challenging because long-running, larger node count jobs may be more sensitive to a less reliable system than their smaller job counterparts. Fault injection capabilities were added to Batsim, an advanced job scheduler and underlying cluster infrastructure simulator.

The toolkit can evaluate different workloads for different system purchases (e.g., a throughput cluster with smaller jobs vs. an ATS, short for Activity Tracking System, with long-running large jobs). Furthermore, it can help optimize with respect to metrics such as job size, memory errors and intervals between writing simulation checkpoints. Personnel used such studies during a recent procurement system evaluation and will similarly use them to evaluate future HPC system purchases.

## Solving “Barren Plateaus” is the Key to Quantum Machine Learning

Many machine-learning algorithms on quantum computers suffer from the “barren plateau” of insolvability, instances in which such algorithms run into dead ends on optimization problems. This challenge had been relatively unstudied — until now. Rigorous theoretical work has established theorems that guarantee wheth-

er a given machine-learning algorithm will work as it scales up on larger computers.

Machine-learning algorithms translate an optimization task — say, finding the shortest route for a traveling salesperson through several cities — into a cost function. This is an example of a mathematical description of a function that will be minimized. The function reaches its minimum value only if the problem is solved. The recent work by Laboratory theoreticians solves a key problem of usability for quantum machine learning. The team rigorously proved theorems establishing the conditions under which certain architectures of variational quantum algorithms will or will not have barren plateaus as they scale up. The theorems enable algorithm developers to guarantee that the architecture is scalable to quantum computers with a large number of qubits.

### MISSION OPERATIONS

## ALDFO Supervisor Named to National Board of Boiler Inspectors

Randall Austin, the Laboratory's chief boiler inspector, has been named an honorary member of the National Board of Boiler and Pressure Vessel Inspectors. Austin is currently a supervisor in the Engineering Services Division of the Associated Laboratory Directorate for Facilities and Operations (ALDFO). The board consists of approximately 60 members, including chief inspectors from each state, city, and other jurisdictions. Not only is this appointment a huge honor, it presents a great opportunity for Austin to provide guidance on new policies that cover design, maintenance and inspection requirements.

## Almost 11,000 Laboratory Employees Join DOE Complex in Pausing for Safety and COVID-19

As part of a DOE safety pause, 10,688 Laboratory employees took time to learn from their managers about the Laboratory's safety priorities, COVID policies and vaccine progress. The message was part of a DOE-wide work pause to ensure the DOE Complex shares lessons learned, receives feedback from employees and follows CDC recommendations for COVID-19 procedures and vaccinations.

Through team meetings and online training, the Laboratory used the pause to emphasize the need to stay

safe, to encourage employees to proactively consider potential safety issues and to crosswalk the DOE COVID-19 Workforce Safety Plan with LANL policies. Managers also leveraged the pause to answer employee questions and ensure employees across the Laboratory follow COVID policies.

(Note: 10,688 employees have received credit for the DOE safety pause as of 3:30 p.m. on March 16, 2021.)

## Construction Wraps on New Modular Metrology Laboratory

The Laboratory's Prototype Fabrication Division has started to meet enhanced program needs, thanks to a new manufacturing center. Talented fabricators responsible for making a variety of science and engineering devices/systems will now design such products even more efficiently.

The reason behind such enhanced efficiency is the recent completion of renovations and upgrades to one of the Laboratory's machining facilities. Such upgrades include the construction of a new, 1,300-square-foot laboratory space, along with a remodel of a secure vault. The finished product means that division personnel can now keep up with the Laboratory's increased demand for non-nuclear components and as a result ensure that the nation's stockpile remains safe and secure.

The scope of the project was two-fold:

- Restore a secure vault to a machine shop and upgrade the facility to a state-of-the-art manufacturing center. The work included all required mechanical, electrical, plumbing, architectural, fire protection/life safety and network upgrades.
- Construct a modular metrology laboratory located next to the vault. This lab is attached to the vault by way of a vestibule.

The \$4.7 million project began in 2019 and wrapped in February 2021. The project was completed with no safety or security issues, with the bulk of the work occurring between June and November 2020 amid COVID-19 work configurations. Also notable is that nobody on the team contracted the COVID-19 virus.

With the upgrades — along with the equipment and machinery moved into their new space and fully commissioned — the modular metrology laboratory is officially active and ready to meet mission milestones and deliverables.

## Finance and Human Resources Develop New, Integrated Staffing Plans with Financial Forecasts

The Laboratory's Finance and Human Resources divisions collaborated to integrate staffing plans (outlooks designed to assess employee hiring and attrition) with financial forecasts. These new integrations enable personnel to conduct more realistic and accurate labor forecasting, a Laboratory prime cost category.

The integrated plans also ensure that financial forecasting within Oracle complements project-control forecasting. Reliable and timely forecasts are indispensable when it comes to evaluating program performance, as well as planning as to when and where people and materials will be needed.

Aligning all support systems — financial, human resources, acquisitions, and project controls — precisely and strategically supports the Laboratory's mission, as well as the government officials tasked with Laboratory oversight.

## FIN-INST Collaborates with Los Alamos Field Office to Decrease Actions Awaiting Approval for the Institutional Programmatic & Strategic Partnership Projects

The Laboratory's Institutional Programmatic & Strategic Partnership Projects (FIN-INST) worked closely with the Los Alamos Field Office regarding the approval process for the following: (1) funding acceptance packages, (2) inter-agency agreements, (3) inter-entity work orders for integrated contracts, and (4) work authorizations. This collaborative effort improved approval turnaround, on average, from 2–3 weeks to one week.

## Increased Focus on Safety Communications

To focus and highlight safety topics, the Laboratory's communications team has developed a special plan involving the use of multiple communications channels. The team is also tracking these channels monthly to ensure goals are met and a variety of topics is covered.

In February 2021, communicators wrote 12 safety stories (ten in the Laboratory-wide newsletter LANLToday and two in Associate Laboratory Directorate newsletter).

ters). Among the highlights from February was a SCoR (Safe Conduct of Research) story titled “Creating a legacy of safety for radiological workers,” a story headlined “Stocked supplies and a good catch at TA-55” and a story called “Feral cows pose hazard on area roads” (this latter story received the most readership of all the safety stories published in February).

## Laboratory Releases New and Improved Code of Conduct

The Laboratory has released a new and improved Code of Conduct to inform employees and help them apply Laboratory values to their work lives. The new document features a modern design, current policy language, Laboratory resources, and common ethical pitfalls. In an introduction to the code, Director Thom Mason wrote that that no business or mission objective is worth achieving if we must sacrifice our integrity to do so. He also explained that all employees are responsible for conducting themselves with integrity as the Laboratory carries out its important national security mission.

## Last of Legacy Waste Removed from TA-18

On March 1, 2021, the last of legacy radioactive waste was loaded and removed from the Laboratory’s Technical Area (TA) 18, thereby achieving a long-awaited milestone. One of 17 Laboratory properties included in the Los Alamos Scientific Laboratory National Historic Landmark District, TA-18 is a site best remembered for its contributions toward developing a uranium gun bomb known as “Little Boy” and an implosion weapon known as “Fat Man.” Removing this waste took the coordinated efforts of employees in two Associate Laboratory Directorates: Facilities and Operations and Environment, Safety, Health & Quality, and Safeguards and Security.

## Load-Tap Changer Returned to Working Order

This week, repairs to the Load-Tap Changer (LTC) were completed by subcontractor SPX with support from the following Laboratory organizations: Maintenance Site Services, Engineering Services and Utilities and Institutional (UI) Facilities. The LTC enables personnel to adjust manually/remotely distribution voltage based on demand.

The Laboratory’s Associate Laboratory Directorate for Facilities and Operations (ALDFO) overcame a number of challenges to return the LTC to working order. For example, replacement boards were shipped overnight when personnel discovered that the initial boards were flawed and thus could not be properly installed. Personnel also worked weekends to complete repairs. ALDFO coordinated this work under adverse weather conditions, as well as COVID-19 protocols for the Laboratory and the subcontractor. UI support included lineman, substation electricians, carpenters, engineers, and operations personnel.

Personnel performed post-maintenance testing during the first week of March, with Transformer 1 returned to normal operations following successful tests. The repaired LTC will add support throughout the Laboratory’s electric grid and enable power to be redirected for maintenance.

To access the damaged parts, approximately 8,600 gallons of FR3 fluid from the main tank and 800 gallons of oil from the LTC had been drained multiple times. Oil was stored in a tank and in secondary containment throughout the repairs. In addition, the LTC had an internal leak in which oil was mixing from the main tank into the LTC. Consequently, large deposits of grime buildup were cleaned before returning the transformer to service. This roughly \$300,000 activity was funded as corrective maintenance through the Maintenance Site Services–UI FY20/21 maintenance baseline.

## Minority Engineer Magazine Names Laboratory Among Top 20 Government Employers

*Minority Engineer* magazine recently awarded the “Top 20 Government Employers,” placing the Laboratory tenth on the list. These top 20 employers represent the top companies or government agencies in the country that the magazine’s readers would most want to work for because they provide a positive work environment for engineers from minority groups and diverse cultures.

To select the top 20, the magazine sent a randomly chosen group of readers a survey, which culminated in the announcement of the winners in the winter 2020–2021 edition. An Equal Opportunity Publication, *Minority Engineer* is the most widely read career magazine in the nation for students and professional engineers who are members of minority groups and diverse cultures. It is distributed to accredited engineering



schools and industry-specific professional associations and societies.

## **Standards and Calibration Laboratory Collaborates with TA-55 to Increase Safety and Time Savings**

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On March 2, 2021, the Standards and Calibration Laboratory's physical calibration team hosted an event onsite at TA-55 to calibrate scales and drum transporters used for waste management and shipping. It was the second TA-55-based event in the past year, which enabled employees at the Plutonium Facility to enjoy the newfound ease and safety of the calibration team coming directly onsite while still adhering to COVID-19 policies and precautions.

Calibration is required to maintain accuracy standards for the equipment used to characterize and weigh hazardous materials moving through the waste shipment process. To meet LANL Metrology Program requirements, equipment making these measurements must be traceable to National Institute of Standards and Technology (NIST) standard units of measure.

Typically, TA-55 employees must load equipment onto trucks, secure it, transport it to TA-3 and then wait for several weeks to bring it back into use. Bringing the calibration event to TA-55 makes it increasingly safer for employees and saves time and money by completing all large-scale calibrations throughout TA-55 in only two days a year rather than losing valuable time with the equipment out of commission while in line at TA-3. This was the second calibration event at TA-55, and such calibrations are scheduled to take place every October and March to keep equipment up and running while lowering safety risks for employees.

## **Successful Experiment uses Everbridge to Schedule Vaccinations**

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On March 16, 2021, the Laboratory's Emergency Management Division and the Vaccination Team for the first time used the Everbridge system to reach out to approximately 125 employees over the age of 60 with high-risk medical conditions registered through Occupational Medicine.

The goal was to use this sitewide notification system to schedule vaccination for these employees. This exper-

iment's success means that Emergency Management and Occupational Medicine hope to use Everbridge in the future to more efficiently schedule vaccinations as additional vaccines from New Mexico become available.

## **Trinity Electrical and Mechanical Upgrade a Success**

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On March 12–14, 2021, the Laboratory's High Performance Computing (HPC) Division and affiliated facility personnel completed a major electrical and mechanical upgrade to the infrastructure supporting Trinity and other computing resources:

- The electrical feeds for Trinity were rerouted from temporary power distribution to permanent substations supporting 4-wire electrical distribution.
- Four large valves that regulate water flow to Trinity were examined and replaced to ensure continued water-cooling.
- Significant networking, file system and hardware support work was completed.

Personnel timed work to coincide with the Trinity capability computing campaign to minimize disruption to the HPC computing community. All efforts were rigorously planned and executed, with a minimum of personnel interaction, and were completed successfully without any security or safety incidents.

## **WCATS Wall-to-Wall Inventory Team Completes Inventory of Waste Containers**

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The Waste Compliance and Tracking System (WCATS) Wall-to-Wall Inventory Team performed a waste inventory of approximately 5,850 hazardous, low-level, mixed low-level, and transuranic waste containers and items. These containers and items were located in more than 200 staging and storage areas across 28 Technical Areas at the Laboratory.

The team (1) planned the assessment, (2) wrote and developed new procedures and checklists, and (3) trained new team personnel to use specialized mobile device equipment. Team members also coordinated facility-specific inventories with site personnel (hosts), waste management coordinators, waste generators, and facility management. Such inventory efforts were designed to verify and validate waste data discrepancies identified in the WCATS database.

As a result of this effort, nearly 2,200 containers — more than 34 percent of the inventory in the database — were identified as having been appropriately dispositioned and no longer on Laboratory property. The updated WCATS database much more accurately reflects the waste currently stored at the Laboratory, thereby significantly improving Triad National Security's quality and operations mission.

During this time, more than 35 WebEx training classes were developed for WCATS users, including information on procedures to improve accuracy and prevent administrative errors. The extensive inventory review has improved the ability of WCATS users to manage the Operating and Administrative Record for the Laboratory and comply with the Hazardous Waste Facility Permit.

WCATS now accurately records required waste-related information, tracking waste from the point of generation through final disposition. Triad seeks to constantly improve its performance and comply with federal and state regulatory requirements through accurate and timely data in the WCATS system.

#### COMMUNITY RELATIONS

## Interactive New Publication Highlights Laboratory Community Work

Transparency is a key tenet of the Laboratory's approach to community activities, and the Community Partnerships Office (CPO) has just released an [online publication](#) with information on the Laboratory's 2020 work in education, economic and workforce development and community giving. [See the online report](#) (it is available publicly).

Because tracking the challenges caused by the COVID-19 pandemic was so important last year (and continues to be), the report includes a section on the response to COVID-19 from the Laboratory, its employees and operator Triad National Security, LLC (Triad). Also covered is Triad's wider work in supporting the region, with information on the benefits of grants and sponsorships under its Community Commitment Plan, as well as a list of the organizations that received financial support. The publication also includes a letter from Triad's Board Chair (and former Laboratory Director) Mike Anastasio.

## Laboratory Signs Lease on Pacheco Street Office Complex

Los Alamos National Laboratory is strengthening its presence in Santa Fe with the [signing of a 10-year lease](#) of two adjacent office properties totaling 77,856 square feet of space at the corner of Pacheco Street and St. Michael's Drive.

The new location offers meeting rooms, permanent offices, and co-working space for roughly 500 employees in the Laboratory's administrative services sectors, including human resources, procurement, finance, and information technology. No hazardous work will be carried out there.

The relocation project makes the Laboratory one of the five largest, non-public-sector employers in Santa Fe.

The announcement comes on the heels of an earlier one about a downtown space at the corner of N. Guadalupe and W. Alameda, which will be a hub for educational partnerships, workforce development initiatives, media relations, government affairs and technology transfer.

The Guadalupe office will be occupied when COVID-19 regulations are lifted. The Pacheco Street complex is expected to be in use in fall 2021.

## LANL Foundation Publishes Research Findings and Recommendations to Strengthen College and Career Readiness in Northern New Mexico

With the support of a grant from Triad National Security, LLC, the LANL Foundation has released a year-long research study on the condition of college and career readiness and career pathways for students in northern New Mexico. Titled "The Road to Readiness: Equitable Access to Career Pathways and College Transition Supports in Northern New Mexico," this research report and policy brief provides multiple actionable recommendations. Moreover, the report reflects the work of the LANL Foundation team performed in collaboration with 25 administrators from diverse high schools throughout the seven-county region served by the foundation (Los Alamos, Mora, Rio Arriba, San Miguel, Sandoval, Santa Fe, and Taos).

Recommendations for short- and long-term strategies to expand and strengthen college and career services

and programming in the region and other parts of New Mexico include the following:

- Providing each high school with a core team of key staff members.
- Enhancing support for small, rural and tribal schools
- Securing recurring, equitable and sufficient funding.
- Increase broadband access and maximize business and education partnerships.

## SELECTED MEDIA COVERAGE

### [Decades-Long Quest Reveals Details of the Proton's Inner Antimatter](#)

*Quanta Magazine (02/24)*

Twenty years ago, physicists set out to investigate a mysterious asymmetry in the proton's interior. Their results, published today, show how antimatter helps stabilize every atom's core.

### [LANL, Local Groups Reach Out to Homeless of Northern New Mexico](#)

*Los Alamos Reporter (02/24/)*

The Los Alamos National Laboratory Community Partnership Office is providing 633 bags of new clothing for homeless people in the Santa Fe, Taos, Espanola and Los Alamos areas.

### [Los Alamos National Lab Reports Record Spending with small businesses](#)

*KRQE-TV (02/25)*

Los Alamos National Lab is having a record spending year with New Mexico small businesses and they say it's having a great impact on the state's economy—even leading to an expansion. Small businesses in the state are getting an extra boost, thanks to LANL's spending in 2020.

### [NASA's Mars Mission Goal: Find Evidence of Past Life on the Red Planet](#)

*NPR (02/25)*

Nina Lanza is a geologist and the team lead for space and planetary exploration at the U.S. Department of Energy's Los Alamos National Laboratory and part of the science team for Perseverance's SuperCam instrument.

### [LANL Foundation Publishes Research Findings and Recommendations on College and Career Pathways and Readiness](#)

*Los Alamos Reporter (03/02)*

The Los Alamos National Laboratory (LANL) Foundation is pleased to release its yearlong research study on the condition of college and career supports and career pathways for students in Northern New Mexico.

### [Vaccine Development Software Shows Promise in Influenza Effort, Could Help Defeat Coronavirus](#)

*Science Daily (03/02)*

"This work takes us a step closer to a pan-swine flu virus vaccine," said Bette Korber, a computational biologist at Los Alamos National Laboratory and a co-author on the paper.

### [Taos Girls Win Statewide STEM Contest with Cities on the Moon](#)

*Taos News (03/03)*

"The competition is arranged by Los Alamos National Laboratory and Sandia [National] Laboratories. They put out the theme for each year in September," said Avery Blair, a sixth-grade teacher at Taos Charter School who led her students through the months-long competition.

### [Health Officials Talk About Vaccination Efforts, as NM Receives More Doses](#)

*NM Political Report (03/04)*

Human Services Department Secretary Dr. David Scrase said modeling from Los Alamos National Laboratory found that vaccinations are now lowering daily COVID-19 incidence by approximately 50 percent. The modeling found that, without vaccinations, cases would have been increasing in recent weeks.

### [LANL: Vaccine Development Software Shows Promise in Influenza Effort, Could Help Defeat Coronavirus](#)

*Los Alamos Reporter (03/04)*

A novel computer algorithm that could create a broadly reactive influenza vaccine for swine flu also offers a path toward a pan-influenza vaccine and possibly a pan-coronavirus vaccine as well, according to a new paper published in Nature Communications.

### [Unexpected Twist in Quantum Physics May Explain Matter/Antimatter Imbalance](#)

*SciTech Daily (03/04)*

"Although our discovery did not cure the annealing time restriction, it brought a class of new physics problems that can now be studied with quantum annealers without requiring they be too slow," said Nikolai

Sinitsyn, a theoretical physicist at Los Alamos National Laboratory.

### **US Continues Push to Restart Plutonium Pit Production**

*Physics Today (03/05)*

"This mission is not an option," says Dave Eyler, LANL associate laboratory director of weapons production. "We're now in a position where we need to revitalize this capability."

### **Finding the Needles in 'Big Data' Haystacks**

*Albuquerque Journal (03/07)*

Making sense of this ever-increasing racket is vital to national security, economic stability, individual health and practically every branch of science – and the job is getting easier, thanks to the SmartSensors artificial intelligence tool we have developed at Los Alamos National Laboratory.

### **The Perseverance Rover has Recorded the 1st Laser Sound on Mars. It's a 'Snap!' Not a 'Pew!'**

*Space.com (03/07)*

The SuperCam observations allowed the team to determine that Máaz has a basaltic composition. Basalts are igneous, or volcanic, rocks that are common on Mars as well as Earth. But it's unclear at the moment if Máaz itself is volcanic, said SuperCam principal investigator Roger Wiens of Los Alamos National Laboratory, a U.S. Department of Energy facility in New Mexico.

### **US Nuclear Lab to Relocate Hundreds of Workers in New Mexico**

*Associated Press (03/08)*

One of the nation's premier nuclear laboratories announced Monday that it will be moving hundreds of employees from its sprawling campus in the mountains of northern New Mexico to Santa Fe as part of a real estate deal that officials described as the largest job relocation in the capital city's history.

### **LANL: Physics Experiment Boosts Evidence for Sterile Neutrinos**

*Los Alamos Reporter (03/09)*

Analysis of results from an experiment called Mini-BooNE at Fermilab has provided yet more evidence that particles called "sterile neutrinos" could indeed exist, supporting results from a 1990s Los Alamos National Laboratory experiment that indicated an update to the Standard Model of physics might be in order.

### **Los Alamos National Laboratories Selects Titan Technologies to Support Classified Research with New Data Analysis Solution**

*Yahoo Finance (03/10)*

Triad National Security, which operates Los Alamos National Laboratories, announced that it has selected a new artificial intelligence (AI) and machine learning (ML) solution from Titan Technologies to support LANL's classified research goals.

### **HAWC Gamma Ray Observatory Discovers Origin of Highest-Energy Cosmic Rays in the Galaxy**

*Los Alamos Reporter (03/11)*

A long-time question in astrophysics appears to finally be answered, thanks to a collection of large, high-tech water tanks on a mountainside in Mexico.

### **A Year of COVID-19 in New Mexico: Lessons from the Data**

*KRQE-TV (03/11)*

KRQE News 13 spoke with Judy Maurant, a biological physicist at Los Alamos National Labs, to learn what a year of data reveals about our state's response.

### **Los Alamos Fire Department Readies for Wildfire Season**

*Los Alamos Daily Post (03/11)*

The LANL Wildland Management Program has been instrumental in assisting LAFD to provide the best customer service to LANL as well as the County, Sterna said.

### **Hydrogen May Power the Future of Commercial Trucking**

*Santa Fe New Mexican (03/14)*

Developing a dependable, long-lasting hydrogen fuel cell for trucks is the focus of a new Department of Energy consortium called the Million Mile Fuel Cell Truck, known as M2FCT, which is co-led by Los Alamos National Laboratory and kicked off at the beginning of a new year.

### **LANL: New Machine Harnesses Earth's Magnetic Field to Detect Chemicals**

*Los Alamos Reporter (03/15)*

A Los Alamos National Laboratory-designed spectroscopy instrument allows scientists, industry, and governments to decipher even trace amounts of chemicals using the Earth's own magnetic field.

### **Los Alamos National Laboratory Monitors Emerging Issue of PFAS**

*Los Alamos Reporter (03/15)*

The Los Alamos Reporter reached out to Los Alamos National Laboratory to find out more about PFAS and



its potential uses at the Lab over the years. . . Cassidy Boorman said LANL became aware of PFAS as an emerging contaminant in 2018 and took immediate action to begin investigating any possible presence of PFAS on the site and generally gaining a better understanding of it.

#### **[A Month on Mars: What NASA's Perseverance Rover Has Found so Far](#)**

*Nature (03/16)*

The instrument zaps rocks with a laser to vaporize small portions and study their chemical makeup. Through this analysis, the scientists see that Yeegho shows signs of having water locked up in its minerals, said Roger Wiens, a geochemist at Los Alamos National Laboratory in New Mexico who is head of the laser instrument team.

#### **[New Generator System Delivers Large Radiation Doses Directly to Cells](#)**

*Los Alamos Reporter (03/16)*

Improved options for cancer treatment are on the way, thanks to a new system developed at Los Alamos National Laboratory for producing alpha-emitting medical radioisotopes intended to target and overpower diseased tissue while sparing the healthy tissue around it.